

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest Newsletter serving the Amateur Radio Satellite Community

Number 94/95
January 28, 1985

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UoSAT-OSCAR 11 Demos PACSAT Concept

The first demonstration of store-and-forward packet radio in an Amateur Radio satellite system has been successfully achieved by groups in England, Los Angeles and Hawaii. The demonstration is part of a proof-of-concept experiment. The PACSAT Project design may evolve from further DCE success.

According to Martin Sweeting, G3YJO, messages were exchanged between W3ZIA in Hawaii and G3YJO in Surrey, England, as well as NK6K in Los Angeles. The first success came on orbit 2057 of UO-11 according to G3YJO.

According to NK6K, the following messages were down-linked from UO-11 using an "embryonic" software package.

"ALL UOSAT TEST MESSAGE"

"ALL UOSAT DCE TEST MESSAGE FROM UNIVERSITY OF SURREY ENGLAND"

"ALL UOSAT These messages are a test of the embryonic store and forward packet radio service on UoSAT-Oscar-11."

"ALL UOSAT The tests are running on the Digital Communications Experiment NSC-800 computer; assisted by the RCA 1802."

"ALL UOSAT They form part of a proof-of-concept demonstration of techniques by AMSAT; VITA; and INTER-PARES at the Pacific Telecommunications Council annual conference in Honolulu, Hawaii this weekend."

"ALL UOSAT The demonstration has been organised by Larry Kayser WA3ZIA; DCE software and support by Hugh Pett VE3FLL and Harold Price NK6K; UoSAT support and groundstation activities by Roger Peel G8NEF and Neville Bean G8NOB."

"ALL UOSAT Thanks are also due to radio amateurs in Hawaii; the Los Angeles area and the Ottawa area for their assistance."

"ALL UOSAT These messages are a test of the embryonic store and forward packet radio service on UoSAT-Oscar-11."

"ALL NK6K DCE message system TEST message; from Redondo Beach, CA."

The message system is a demo prototype developed by VE3FLL for the Hawaii demonstration. The software was up-



Harold Price, NK6K, (left) accepts a jar of Marmite from Martin Sweeting, G3YJO. Marmite is a bizarre concoction of fermented yeast which is alleged to cause revulsion in anyone born west of Britain.

loaded to UO-11 by NK6K over the weekend preceding the demonstration.

In addition to the DCE team in Canada and the US, and the spacecraft controllers at the University of Surrey, AMSAT members Rick Dittmer, WH6AMX and Chris Wachs, WA2KDL were instrumental in bringing off a successful demo. Rick provided support for the KH6 operation, Chris provided additional ground station support in Los Angeles.

Meanwhile, VITA, the Volunteers In Technical Assistance is promoting the DCE success in terms of its future impact on PACSAT prospects. The following was recently received from VITA.

VITA NEWS RELEASE

JANUARY 17, 1985
FOR IMMEDIATE RELEASE

FOR FURTHER INFORMATION
ANNE HEYNIGER, VITA PUBLIC
INFORMATION OFFICER
(703) 276-1800

BREAKTHROUGH IN LOW-COST TELECOMMUNICATIONS

RADIO AMATEURS COMMUNICATE WITH LOW-ORBITING SATELLITE

USING A TINY SATELLITE NOW ORBITING THE EARTH OVER THE POLES AT AN ALTITUDE OF 429 MILES (690 KM), A TEAM OF TECHNICAL VOLUNTEERS FROM THE U.S. AND CANADA YESTERDAY SENT LETTER-PERFECT PACKET RADIO MES-

SAGES TO ENGLAND FROM HAWAII, AND RECEIVED REPLIES. THE TRANSMISSIONS REPRESENT A BREAKTHROUGH IN THE USE OF LOW ORBITING SATELLITES FOR WORLDWIDE COMMUNICATIONS. INTRODUCING THE NEW CONCEPT AT THE PACIFIC TELECOMMUNICATIONS COUNCIL'S ANNUAL CONFERENCE IN HAWAII, HIGHLY TRAINED TECHNICAL EXPERTS FROM PRIVATE VOLUNTARY AGENCIES IN THE U.S. AND CANADA SENT MESSAGES TO THE UNIVERSITY OF SURREY IN GUILDFORD, ENGLAND, WHERE THE SATELLITE (UOSAT-2) WAS BUILT. THE MESSAGES-DIGITIZED 'PACKETS' OF INFORMATION-WERE STORED IN THE SATELLITE'S ON-BOARD COMPUTER. A FEW HOURS LATER, AS THE SATELLITE PASSED OVER GUILDFORD, THE LETTER-PERFECT MESSAGES WERE DOWNLOADED AND PRINTED OUT AUTOMATICALLY BY THE SURREY GROUND STATION'S SMALL PERSONAL COMPUTER. USING AMATEUR RADIO FREQUENCIES, INEXPENSIVE TRANSMITTERS AND RECEIVERS, AND PERSONAL COMPUTERS TO COMMUNICATE WITH A LOW-ORBITING BIRD, THE SYSTEM THAT WILL UTILIZE THIS TECHNOLOGY IN THE FUTURE (ALREADY KNOWN AS PACSAT), WILL OFFER TELECOMMUNICATIONS NETWORKING AT A FRACTION OF THE COST OF CONVENTIONAL TELEXES. ONCE OPERATIONAL, THE PACSAT SYSTEM WILL PROVIDE ORGANIZATIONS THROUGHOUT THE WORLD MUCH-NEEDED ACCESS TO LOW-COST, RELIABLE TELECOMMUNICATIONS GROUND STATION EQUIPMENT, COSTING NOT MORE THAN \$2000 AND CAPABLE OF OPERATING ON BATTERIES OR SOLAR POWER, CAN BE CARRIED IN A BRIEFCASE. THE FIRST FULL-SERVICE PACSAT SATELLITE IS SCHEDULED FOR LAUNCH ON THE SHUTTLE IN EARLY 1987. SPEARHEADING THE DEVELOPMENT OF THIS TECHNOLOGY ARE VITA (VOLUNTEERS IN TECHNICAL ASSISTANCE), A PRIVATE VOLUNTARY DEVELOPMENT AGENCY IN WASHINGTON, D.C. THAT SPECIALIZES IN TECHNOLOGY TRANSFER; AND AMSAT (RADIO AMATEUR SATELLITE CORP.), AN INTERNATIONAL ASSOCIATION OF HAM RADIO OPERATORS WHO ALSO DESIGN AND BUILD SATELLITES. INTERPARES, A PRIVATE CANADIAN AGENCY ENGAGED IN COMMUNITY-BASED DEVELOPMENT, SUPPORTS THE EFFORT IN CANADA. IN WASHINGTON, PACSAT INTERNATIONAL APPLICATIONS MANAGER, DR. GARY GARRIOTT OF VITA, SAID OF THE CONTACT IN SPACE, "I JUST WISH THE PEOPLE COORDINATING FAMINE RELIEF IN ETHIOPIA HAD A PACSAT TO COMMUNICATE WITH. THEY COULD USE SOLAR ENERGY TO POWER THE RADIO. IT WOULD SOLVE A LOT OF PROBLEMS IN GETTING HELP TO THOSE REMOTE PLACES."

The University of Surrey Bulletin #109 also contained news of the DCE success. ASR and AMSAT congratulates the many involved in the milestone achievement!

ACSSB Experimenter Kits Are Ready

The Amplitude Companded Single Sideband (ACSSB) experimenter kits previously described in ASR and elsewhere are now ready for distribution according to the ARRL's Project Engineer for ACSSB, Greg Bonaguide, WA1VUG. ARRL has purchased the ACSSB industrial surplus of Sideband Technology, Inc (STI) for the purpose of inoculating the amateur bands with the newest and most advanced analog voice processing techniques and to support Project Companion. AMSAT and Project OSCAR are joint partners with ARRL in Project Companion. AMSAT's objectives are to improve the realizable signal-to-noise ratio using satellites such as AO-10. Scores of advanced experimenters had signed up for the very limited supply of ACSSB equipment at presstime. AMSAT had sent invitation replies to all those who had inquiries on file at WA2LQQ as of 15 Jan. 85. Among the experimenters proposing tests for the ACSSB equipment were active satellite users, EMEs, UHF DXers and HFers.

There were seven different equipment and documentation packages available according to the announcement sheets provided by ARRL. The kits ranged in readiness from complete RF and audio processor boards with an extensive documentation package (\$75) to scrap RF boards good for parts only (\$10) shipping not included.

Meanwhile, it was learned that Yaesu Electronics, Inc. of Los Angeles has been granted an experimental license and call sign (KO2XHB) by the FCC for the explicit purpose of developing ACSSB equipment and techniques.



Jim Smith, KA7APJ, of Seattle who is the proprietor of Spectrum West and who has donated a major prize to the member recruitment drive.

Member Recruitment Drive Winners Claim Prizes

The winners of the member recruitment drive were announced by AMSAT HQ recently. These individuals together with others accounted for more than 150 new members signed up during the contest period. Prize selection was incomplete at presstime and will be covered in the next issue. Meanwhile the top finishers were:

1. N3CEG 26 points (Selected the FT-726R donated by AMSAT)
2. KA1M 20 points (Selected the Dynetic dual axis rotator donated by Dynetic Systems)
3. N8ETY 11 points (Selected the ARR In-Line 2 meter GaAs-FET preamp donated by ARR)
4. WA5ZIB 10 points (Selected the Mirage D1010N 70 cm amplifier donated by Mirage)
5. WA6VGS 6 points (Selected the Landwehr 2 meter mast-mounted GaAsFET preamp donated by Henry Radio)
6. WA2LQQ 5 points (Disqualified self)
6. K8OCL 5 points (Tied with WA2LQQ, WA2LJM. Selection pending)
6. WA2LJM 5 points (Tied with K8OCL, WA2LQQ. Selection pending)
8. Dick Ruhr 4 points (Tied with Paul Beeman and WB5PMR; pending)
8. Paul Beeman 4 points (Tied with WB5PMR and Dick Ruhr; pending)
8. WB5PMR 4 points (Tied with Dick Ruhr, Paul Beeman; pending)

N2CF Moves To New ARRL Post

AMSAT's General Manager/Executive Director, Bill Lazaro, N2CF is stepping down as a paid employee effective 18 January. In his statement to the AMSAT Board of Directors Bill said he feels he has accomplished many of the tasks he set out to do when he assumed his present post and that the position can best be staffed henceforth on a volunteer basis. Bill indicated he wishes to continue in that volunteer capacity.

Simultaneously, N2CF has announced his acceptance of a new ARRL post. Effective 21 January, he will become

Development Manager for the ARRL working in their Washington D.C. office. The post is a new one created recently in response to the ARRL Board's mandate to develop an aggressive membership growth program. Bill moved to Mt. Airy, Maryland, a Washington D.C. suburb, to assume the AMSAT post in 1983. It is understood his reticence to move to Newington prompted the decision to base the new ARRL position in the Washington D.C. office. The Washington office is staffed at present by ARRL General Counsel Chris Imlay, N3AKD, a law clerk and clerical staff. Perry Williams, W1UED, spends several days per week working from the Washington office as well. How (if) Lazzaro's new function will relate to the General Counsel's and that of Williams is unclear. Speculation that Lazzaro's assignment to the Washington office signified the vanguard of a major ARRL move to that area was dismissed out of hand by a senior ARRL official.

The hiring of N2CF by AMSAT in March, 1983 culminated a search of nearly eight months and constituted the first time in its history that AMSAT had a paid General Manager. Previously founder Perry Klein, W3PK had held the dual position of President and General Manager. The AMSAT Board decided to hire a full-time GM/ED in 1982 when it appeared a vigorous growth program was in order to advantage the organization of the new communication resource then about to be commissioned (Phase 3B, aka AMSAT OSCAR 10). (See ASR 53/54).

AMSAT presently has two paid employees: Bill Lazzaro and Martha Saragovitz. Martha is Office Manager and has been with AMSAT for seven years. Ms. Saragovitz indicated to ASR last week that she is seeking clerical help now so she may assume some of the functions the departing Lazzaro had fulfilled. The AMSAT Headquarters office functions have expanded in recent years to include the AMSAT Software Exchange as well as membership services.

Meanwhile many of AMSAT's vital functions continue to be filled by a staff of skilled volunteers. KB2M, editor of *AMSAT Satellite Journal* is, for example, a professional editor for a major microwave magazine. "Additional skilled volunteers are always being sought," said AMSAT Talent Scout WD4FAB.

Short Bursts

- The Southwestern Division of the ARRL will hold its Tropical Hamboree February 2-3 at the Flagler Dog Track in Miami. Area Coordinator Mike Crisler, N4IFD, has planned a superb program of activities for satellite enthusiasts including live AO-10 demonstrations, a well-staffed booth and free handouts and information. Mike could use your help in the booth and operating the demo station if you plan to be at the Hamboree. Contact Mike at 305-382-4044 evenings.
- New Area Coordinators announced by Chief Area Coordinator WA6VGS are Robert Dalleske, W6AMW (Northern California); Ross Forbes, WB6GFJ, (North Central California); Cliff Buttschardt, W6HDO (South Central California); Harry Bluestein, N6TE (South Southern California !) and (re-joining the staff) Bud Schultz, W6CG (Southern California). Congratulations to the new (and renewed) appointees!
- An AMSAT Management Conference (AMC) similar to the one held in Ohio in early December is in the planning stages

in California. Newly appointed Area Coordinator WB6GFJ is the focus of the planning.

- The Fourth Annual Space Development Conference sponsored by the L-5 Society will be held at the Shoreham Hotel April 26-28. Information may be obtained by calling 800-323-5155 (312-299-3131 in Illinois) or by writing Suite 205, 2400 E. Devon Ave., Des Plaines, IL 60018. The theme of the conference will be "The Returns From Space" and the conference will focus on the wide variety of benefits space development will provide during the next two decades. The L-5 Society will also be throwing a party to celebrate its 10th birthday.

- The Arrow Communication Association of Ann Arbor, MI, has awarded AMSAT's Michigan Area Coordinator Larry Koziel, K8MU, a Special Service Award for his public relations efforts on behalf of AMSAT, packet radio and the PAC-SAT Project. The award was made on December 11 at the Association's annual Christmas dinner in Ann Arbor. Congratulations to Larry on this fine achievement and the well-deserved award. AMSAT is proud to have such highly motivated individuals on its team!

- The Project OSCAR orbital prediction calendars were due to be mailed the week of January 21.

- A new columnist in the new magazine, *AMSAT Satellite Journal*, is Ray Soifer, W2RS. Actually Ray has been around the satellite field for as long as there have been artificial satellites. Ray's early articles in *QST* with W3PK (then K3JTE) are now classics in early satellite literature. Now W2RS has agreed to pick up the notion of the G3IOR ORBIT column, Worldwide Satellite Activity in ASJ. But he desperately needs material from which to distill the column. Please send your inputs to: Ray Soifer, W2RS, 60 Waldron Ave., Glen Rock, NJ 07452.

- In DX news, ON7HP was supposed to be working AO-10 from 4S7 for the month of January. Did anyone work him there? QSL direct. W1BIH/PJ2 active until late spring. ZD7KH now active. FK1SB on with great SSB signal prior to civil unrest in New Caledonia.

- Tests of batteries of RS-5, 7 and 8 show various results according to UA3CR as reported by G3IOR. RS-5's battery is almost ruined. W0CY and others have reported anomalous telemetry from RS-5 during early January when the Russian birds were experiencing eclipses. RS-5 was falsely identifying itself as RS-3 and sending garbled telemetry. RS-7's battery is in mediocre condition while RS-8's is in excellent condition according to this report. RS-5 and 8 will be in transponder mode while 7 will be in robot and bulletin mode for the next period. All satellites will be off on Wednesday Moscow time which is from 2100 Tuesday to 2100 Wednesday UTC.

- Additional information on the newest Russian birds is filtering through now. Work is complete on RS-9 and it is undergoing bench test in Moscow. It's a Mode A bird with a beacon on 29.400 MHz. It's slated for launch late this year with RS-10 which continues under development. RS-10 will have a Mode A capability but will also have a new mode, Mode K. Mode K will have a 15 meter uplink and a 10 meter downlink according to G3IOR who attributes this information to UA3CR.

- An error crept into the AO-10 telemetry printed in ASR 93. Please re-label A7 to read "2 m xmtr temperature." The equation remains unchanged.



Paying a courtesy call on one of the world's most distinguished hams, Don Wallace, W6AM, is a group from AMSAT. (l-r) ZL1AOX, VE2VQ, W6AM, WA2LQQ, N4QQ, N2CF, K8OCL, KB2M. W6AM is AMSAT LM-764 and holds DXCC Honor Roll (Phone) #1!

Sustaining Life Membership for 1985 Available

AMSAT HQ has announced the immediate availability of the 1985 Sustaining Life Memberships. Once again you, the AMSAT Life Member, have the opportunity to reaffirm your confidence and loyalty to the Amateur Space Program ideals by your participation in this meaningful program.

Last year hundreds of your fellow Life Members upgraded their membership class to Sustaining Life Member. Their reward was in knowing that they had once again supported the organization and helped to defray the cost of ongoing membership services. And their participation was recognized with a unique, handsome lapel pin which distinguished them as Sustaining Life Members.

Now the 1985 Sustaining Life Memberships are available. But this year it is more important than ever to have YOUR support. In addition to the membership services that are always provided, AMSAT has begun a new magazine to better serve you. *AMSAT Satellite Journal*, *ASJ*, will be on its way to you shortly. We plan 8 issues per year. But the really big news for Life Members to sit up and take notice about is the news that another Phase III satellite is on the way! That's right! Phase IIIC will be launched in 18 months. And it will have a great array of features bound to capture your attention. Features such as Mode B, Mode SL (A SUPER-performing Mode L); Mode L digital and an S-Band beacon. Plus an improved orbit and antennas that will make Phase IIIC a real "star" performer. But all this depends on your support now.

By becoming a 1985 AMSAT Sustaining Life Member today, you'll be helping AMSAT realize its goals and you'll be helping yourself into a new satellite system, a new magazine and the satisfaction of knowing you're an integral part of the team that makes it all happen. Your modest \$15, tax deductible donation is all it takes. And your status as a 1985 SLM will be promptly recognized with a special new, distinctive SLM pin for 1985 which features the AO-10 tri-star silhouette in gold and blue finish. A proud badge for you to display everywhere. Send today. AMSAT, P.O. Box 27, Washington, DC 20044 or call 301-589-6062. MC/VISA accepted.

Voice Bulletin Service On AO-10 Begins

The splendid series of AMSAT nets has a legacy extending over a decade of performance. The calls W3PK, WA3NAN, W3TMZ, W3KMY, WB2TNC, W6SP, W3IWI, KO5I, N3AR, WB4ZXS, KE0T, W6CC and others are familiar ones to AMSAT veterans. These calls evoke memories of OSCAR 6, the heyday of Mode B on AO-7 and the beginnings of Mode J on AO-8.

Similarly, the call signs W8GQW, N4HY, W7FF, WD0HHU, N6TE, W0CY and WA2LQQ now ply the airwaves on behalf AMSAT. These fellows carefully sort, analyze, collate, verify, translate and then present news of AMSAT and related space activities on which the community thrives. Dozens of others operate local VHF/UHF nets in the interest of local satellite users groups.

Now however, the AMSAT HF Net Control Stations (NCS) are becalmed in the dog days of declining HF propagation. The higher frequencies (10 and 15 meter bands) are mostly poor with the former virtually unusable for scheduled activities and the latter spotty at best. This drives HF users down in frequency. The result is that 20 meters is seeing extremely high usage. This further degrades the performance of the AMSAT 20 meter nets which have suffered increasingly in recent years from QRM.

Moreover, the distribution of information from AMSAT HQ to NCS around the world and the ability of AMSAT to keep in contact with its Directors and Officers using the HF bands has been all but obliterated. Even the 75-Meter nets, which had been largely immune to the propagation decline and QRM aggravations, are now affected. Thus, according to AMSAT officials, it is time to begin an evolutionary process which will result in greater reliance on AMSAT OSCAR 10 and its successors for Net operations and information distribution.

With the forward-planning expertise of Operations Vice President (acting) John Champa, K8OCL and Net Manager Wray Dudley, W8GQW, a series of experimental voice bulletins via OSCAR 10 began on 6 Jan. 85. The transmission of AMSAT Bulletins is similar to a service initiated by the RSGB last year. The RSGB service aimed primarily towards European consumers (See ASR #84, 13 Aug. 84). The new bulletins also build on the experience derived by W6KAG who had been retransmitting the pre-recorded AMSAT Southwest Pacific Net originated by W6CCG. (See ASR #70, 24 Jan. 84)

According to AMSAT President WA2LQQ, the AO-10 bulletins will have several important functions:

- 1) Reliable, predictable, current information to consumers via easily heard satellite transmissions.
 - 2) Reliable, predictable, current information to NCS for further dissemination to consumers.
 - 3) High quality audio for real-time VHF/UHF gateway use.
 - 4) High quality audio for recording and later retransmission on other nets and frequencies (particularly local nets).
 - 5) Introducing ACSSB techniques using a highly practical application.
- And, beginning in early spring, 1985,
- 6) Demonstrating the significant performance improve-

ments obtainable with Mode L compared with Mode B when the bulletins are carried on both Modes for ease of comparison.

7) Laying the foundation for the anticipated Mode SL (Super-L) now being planned for Phase IIIC. (due for launch Mid-86).

The 6 Jan. 85 (2130 UTC) inaugural of the bulletins had excellent results according to a sampling of listeners across North America. Early estimates indicate more than 100 stations were on line at the time. The satellite was positioned over 18N, 132W yielding excellent coverage for North America. According to command station VE1SAT/VE6, best operations under the present schedule and pointing angles can be obtained when the satellite is to your west and prior to apogee. The satellite is off-pointed to accommodate seasonal sun-angle variations and is not pointed at the geocenter when at apogee as had previously been the case. On the 6 Jan. inaugural session, the mean anomaly was 78 at the start of the bulletins. (MA 128 is apogee).

The second session came on 12 Jan. 85. As might have been expected, this Saturday session which began at 1700 UTC (MA 69) had good results but not quite as favorable as the first session. The satellite was over 19N, 75W at the time yielding an az-el of 182 by 64 from originating station WA2LQQ. As above, best results can be expected when looking west to the satellite under present satellite orientation conditions.

The Mode B bulletins had been transmitted on the AM-SAT Calling and Net Frequency (ACNF) of 145.957. However, starting with Bulletin #5, Mode B bulletins will be transmitted on Special Service Channel (SSC) H2 with a nominal downlink frequency of 145.962 MHz. (Subject to SSC coordination)

Amplitude Compandored Single Sideband (ACSSB) bulletin transmissions will begin in early spring according to

WA2LQQ. Stations equipped to receive ACSSB will enjoy a substantial improvement in signal-to-noise ratio. Stations which use only simple expander circuits in their receive audio circuits (such as ones designed by WB6JNN and N6TX of Project OSCAR) will enjoy a noticeable improvement. Others receiving on normal SSB receivers will realize no improvement in s/n but will hear what sounds rather like highly compressed audio not atypical of that already apparent in the ham bands. Also, the casual, non-ACSSB listener may note a low-level pilot tone offset from the "zero-beat" by exactly 3.1 kHz. (There is no zero-beat *per se* with SSB, of course). This pilot tone, 10 dB down from voice peaks contains coded information on compression levels at the source and provides a post for locking AFC circuits.

According to ARRL Officials, ARRL also plans ACSSB bulletins via OSCAR 10 later this year. Included will be the regular ARRL voice bulletin regime as heard on W1AW. Project Companion, a joint endeavor of AMSAT, ARRL and Project OSCAR aims to bring this advanced voice processing technique into the Amateur Radio community.

The following table presents planned bulletin transmissions.

Bt#	Day	Date	Time	Orbit	MA	SSP	Notes
3B	Tue	22 Jan	2200	1213	72	18N, 157W	1
4B	Sun	27 Jan	1700	1223	38	25N, 115W	1
5B	Sun	10 Feb	2040	1252	72	16N, 154W	2
6B	Sun	17 Feb	1600	1266	74	15N, 89W	2
7B	Sat	23 Feb	1200	1278	76	14N, 33W	2,3
8B	Sun	03 Mar	1600	1295	28	25N, 145W	2,4
9B	Sat	09 Mar	1400	1307	74	13N, 76W	2,4
10B	Sun	17 Mar	1200	1323	150	3S, 21W	2,3,4,5
11B	Sun	24 Mar	1530	1338	75	11N, 112W	2,4
12B	Sun	31 Mar	1400	1352	147	4S, 65W	2,3,4,5
13B	Sun	07 Apr	1545	1367	35	21N, 160W	2,4
13L	Sun	07 Apr	1635	1367	52	16N, 154W	4,6

NOTES:

1. Downlink frequency 145.957 MHz; the ACNF.
2. Downlink frequency 145.962 MHz; SSC H2 (Subject to SSC coordination).
3. Marginal performance anticipated due to poor look angle from originating station.
4. Assumes continuation of transponder schedule introduced 01 Jan. 85. If transponder schedule is adjusted, expect these schedules to be adjusted as well.
5. Marginal performance anticipated due to post-apogee timing.
6. Initial trial of Mode L bulletin service. Tentative downlink frequency is 436.280 MHz, USB.

Two-Meter QRM Threatens OSCAR Operations

Distressed satellite users are reporting an upsurge in inadvertent interference to satellite operations. In many areas of the country, 2 meter operators are working within the 145.800 MHz to 146.000 MHz zone ascribed by gentlemen's agreement to OSCAR use. Mode A uplinks and Mode B downlinks both occupy this limited territory as a check of spectrum allocations will attest.

But satellite users may be inadvertently adding to the QRM by themselves conversing in terrestrial QSOs when the satellite(s) are out of view. What apparently happens is that hams not familiar with OSCARs happen upon the



Mack, W4DAQ, pauses at roadside in his hometown, Demopolis, AL.

QSOs of the satellite users. The satellite users incorrectly believe that since the satellites are out of view, it's OK to work terrestrial stations. But the casual observer, not knowing this to be special turf, assumes he may proceed with QSOs there as well. Obviously the trouble arises when a satellite pops into view and the non-satellite occupant of 145.8 - 146.0 is suddenly accosted by those who would have that portion of the band instantly revert to "Satellite use only!"

The answer to the dilemma is to avoid using 145.8 to 146.0 MHz except for satellite communications. Even those who "know" where all the satellites are, using this turf for terrestrial QSOs opens the door for others. If we are to preserve any semblance of the gentlemen's agreement regarding spectrum occupancy, we must observe our own recommendations and avoid terrestrial QSOs in the "satellite" portions of ALL the bands including 10, 2 and 0.7 meters.

Area Coordinator List

The following is the most recent update of AMSAT's Area Coordinator list. Use your callbook for correct addresses.

- First Call District K1DS(RI); W1JSM (NH); KA1M, W1IAS (MA)
- Second Call District N4EL/2, KW2U (NYC, NJ); WA2LJM (NY)
- Third Call District N3CEG (MD); W3KH (PA)
- Fourth Call District W4AUZ (KY); W0CA/4, W4DWN, WD4HWO, N4IFD, WB4ZXS (FL); W4DAQ (AL); W4FJ, K4SR (VA); WB2LEI/4 (NC); NZ4Q (GA)
- Fifth Call District N5BRG, WB5PMR (TX); WD5GLD (OK); WA9PZL/5 (LA); WA5WHN (NM)
- Sixth Call District WH6AMX (HI); W6KAG, WA6VGS, WB6GFJ, W6CG, N6TE, W6HDO, W6AMW (CA)
- Seventh Call District KA7APJ (WA); W7FF, W7US (AZ); K17L (UT); W7LSV (OR); W7RSY (MT)
- Eighth Call District N8ATB, N8ETY, WA8LAJ, W8PGP, WA8RYD, WB8IFM, N8AEG, WA6YBT/8 (OH); WB8ZTV (WV); K8MU (MI)
- Ninth Call District K9DID, N9HR (WI); W9JUV, W9MXC, K0RL (IL); K1FJ/9, K9PVW (IN)
- Tenth Call District N0AN (IA); W0CA, K0GA (MN); W0IT (SD); K0RZ, W0VO (CO); W0SL (MO); W0CY (KS)

WX-Sat Viewers To Gather Near Washington, DC

A satellite conference of interest to Radio Amateurs will be held in the Washington, DC area from April 15 through 19. The Second International Satellite Direct Broadcast Services Users Conference will be held at the Holiday Inn, near the Baltimore-Washington International Airport. The program, sponsored by NOAA/NESDIS, the National Aeronautics and Space Administration (NASA), and the World Meteorological Organization (WMO), will include formal amateur participation, an exhibit of commercial equipment, plus a variety of seminars. The previous conference, in 1983, attracted approximately 50 Radio Amateurs interested in weather satellite picture reception.

The conference provides a forum for designers and managers of the NOAA and GEOS environmental satellites and their users. The registration fee hasn't been announced



Nick Laub, W0CA, winner of the AMSAT-Stoner Challenge Cup.

yet, but in 1983 it was just \$15. For further information, contact:

Mr. Bob Popham
Satellite Program Specialist NOAA/NESDIS
E/ER2, Room 3301, FB4, Mail Stop D
Washington, DC 20233
(301) 763-7289

New Tapes Available at Video Tape Library

The AMSAT Video Tape library is operated for AMSAT members by Dr. Roger Johnson, WB0GAI. The library was recently augmented with a series of videotapes recorded by WB0GAI at the 1984 Second Annual Radio Amateur satellite Symposium in Los Angeles last November. These tapes are now ready for loan to interested amateurs and groups. Roger tells ASR the new tapes are as follows:

#10 - Introduction to the Symposium; Advanced Gateway Concept by Dr. Al Dayton, KA4JFO; JAS-1 by Harry Yoneda, JA1ANG; Project Companion (ACSSB) by Paul Rinaldo, W4RI and Jim Eagleson, WB6JNN.

#11 - Computers and Satellites by Bob Diersing, N5AHD; OX3FS Memorial Presentation to Dr. Bob Leonard, KD6DG by Vern Riportella, WA2LQQ; Solar Sail Project by Mark Bergham, Robert Staehle and Chauncey Uphoff.

#12 - PACSAT Forum with Harold Price, NK6K, Wally Lindstruth, WA6JPR, Rick Fleeter, WA8VGK, Phil Karn, KA9Q and Martin Sweeting, G3YJO; Satellite Economics by Dr. Tom Clark, W3IWI; Ham-In-Space Activities (shuttle)

by Bill Tynan, W3XO.

#13 - Phase IV and Future Projects by Vern Riportella, WA2LQQ

#14 - The UoSAT 2/OSCAR 11 story. A brief account of the development and launch of the newest OSCAR. With an intriguing audio accompaniment.

These tapes are available in VHS format only at present. Tapes are available for a \$6.00 per tape fee for a 3 week maximum borrow term. A check for the fee (\$6 per tape) plus a second refundable deposit check for \$25.00 should accompany each request. Mail orders or inquiries to: AM-SAT Video Tape Library, c/o WB0GAI, 1627 36th Ave. Court, Greeley, CO, 80634.

Earlier tapes (#1 through #9) continue to be available. Send an SASE for a complete listing.

UoSAT Bulletin-109 18th January 1985

UoSAT Spacecraft Control Centre, University of Surrey

General News

Digital Communications Experiment on UO-11

The DCE on UO-11 successfully demonstrated digital message 'store-&-forward' techniques for the first time last week — with exchanges between UoS, NK6K (LA) and WH6AMX/WA3ZIA/VE3FLL in Hawaii — at the Pacific Telecommunications Conference held in Honolulu. Despite very poor weather in Hawaii making portable demonstrations difficult, messages were exchanged on 16 Jan. around 2100 gmt and the Special Event Bulletin received from UO-9 during the Conference.

Meteorological Spacecraft

NOAA-9

NOAA-9 was launched at 10:42 gmt on 12 December and is scheduled to enter service on 1st February 1985.

UoSAT Spacecraft

UoSAT-OSCAR-9 Schedule

The Bulletin/Digitalker/Telemetry mode at weekends has been changed to transmit approx 3mins of 1200 bps telemetry alternating with approx 6.5 mins of Bulletin — we hope that this format will make it easier to receive complete copies of the Bulletin! The Digitalker experiment has been moved to Mondays where it will alternate with 1200 bps Telemetry, as it is primarily intended for educational demonstrations. The remainder of the formats are unchanged although the usual Wednesday & Thursday schedule has been switched to provide more regular telemetry coverage.

With the increasing use of home computers to display spacecraft telemetry — and the now familiar UO-11 telemetry format — we are seriously considering changing ALL UO-9 telemetry to error-protected or 'checksummed' data via the OBC. This has the very great advantage that the

telemetry data can be checked for errors automatically by using a 'home' computer and automatic archiving and data analysis routines become practicable. The disadvantage is that, as seen on the UO-11 telemetry, the telemetry frame data cannot be so easily read by 'eye' — however we suspect that the majority of users employ computers to display the data and this format would allow real-time displays in 'engineering' units to become standard. Please let us have your thoughts/comments on this. The new schedule is as follows:

Friday - load Bulletin

Saturday - Bulletin/1200 bps telemetry

Sunday - Bulletin/1200 bps telemetry

Monday - DIGITALKER/1200 bps telemetry

Tuesday - CCD Camera - next week Radiation data

Wednesday - Computer check-summed telemetry

Thursday - Whole orbit telemetry survey

The 2.4 GHz Beacon will be in use this week.

UoSAT-OSCAR-11 Operations

The major activity this last week has been associated with the Digital Communications Experiment.

The DCE has been active since May 1984 when it was configured to provide the digital 'bypass' necessary to overcome the break in one of the uplink data paths that caused the communications problems just after launch last March. The provision of the 'bypass' by the DCE restored UO-11 to full operations and enabled the commissioning of the spacecraft to proceed. Software was developed by G8NEF at UoS over the last few weeks to enable the 1802 OBC to assume the role of providing the 'bypass' as part of its routine housekeeping functions (attitude control, whole-orbit surveys, packet communications, programmed command etc.) and thus release the DCE to embark on its own experimental programme to demonstrate the feasibility of 'mailbox' communications.

Preliminary software was developed by WA3ZIA/VE3's group in Canada in conjunction with NK6K and loaded by NK6K into the DCE on UO-11 from the USA after the OBC had assumed responsibility for the 'bypass' functions on 090185. This preliminary test software enabled the DCE to support a very simple digital message 'store-&-forward' facility demonstrated regularly last week to coincide with the Pacific Telecommunications Conference. A great deal of hard work (& long hours) was necessary on both sides of the Atlantic to develop all the spacecraft & groundstation software and support hardware in order to mount this demonstration and get the DCE programme under way — thanks to all involved!

The DCE is intended to provide an experimental facility to evaluate the hardware, software and operational protocols that will be required for a fully operational satellite 'mailbox' system called PACSAT - Packet Communications SATellite. The DCE, with its limited up & downlink capabilities, will only be able to support an experimental rather than an operational facility, hence the DCE will only be available initially to a very limited number stations involved in the development of these experimental software, hard-

ware & protocols. Later, it is hoped that additional stations may be authorised to use the DCE to help evaluate its capability to support global communications. It is anticipated that the additional stations will be selected on a regional basis and that further local users will be supported via 'local area networks' accessing the DCE through the authorised 'gateway' stations.

The amount of downlink time made available to the DCE will be dependent on the other experiments active at any one time. Those interested in PACSAT concepts will be able to monitor progress by observing the DCE traffic and we shall endeavour to keep you up-to-date with developments.

This week's spacecraft operations:

Date	Day	Orbit	Activity/Start Time
110185	Fri	4612	reset 'watch-dog' load DEC software at NK6K

120185	Sat	4631	load DCE software at NK6K
130185	Sun	4638	NK6K loads first two messages
		4641	UoS loads 20 test messages
		4646	UoS uploads DCE messages
		4647	UoS uploads DCE messages
140185	Mon	4660	NK6K switches 145 MHz d/link via OBC.
150185	Tue	4670	switched from DCE to Tlm on d/link.
160185	Wed	4684	145 MHz d/link to tlm
		4685	145 MHz d/link to DCE
		4689	NK6K switched 145 MHz d/link
		4690	UoS switches 145 MHz OFF
			WH6AMX loads message into DCE from Hawaii & 145 MHz ON.
		4691	UoS replies to WH6AMX message using DCE.
170185	Thu	4700	UoS 145 MHz to tlm
180185	Fri	4713	UoS despin manoeuvre
			Zspin: 2m25sec to 5m10sec
		4714	ODATA chs: 2,3 @ 11:09:41

Orbit Predictions By KA9Q

Satellite:	RS-5
Catalog number:	12999
Epoch time:	85008.43968448
	Tue Jan 8 10:33:08.739 1985 UTC
Element set:	211
Inclination:	82.9623 deg
RA of node:	31.7487 deg
Eccentricity:	0.0010918
Arg of perigee:	44.7290 deg
Mean anomaly:	315.4662 deg
Mean motion:	12.05054235 rev/day
Decay rate:	3e-08 rev/day ²
Epoch rev:	13466
Semi major axis:	8033.836 km
Anom period:	119.496696 min
Apogee:	1674.895 km
Perigee:	1657.352 km
Ref perigee:	2564.4494999
	Tue Jan 8 10:47:55.679 1985 UTC

Satellite:	RS-8
Catalog number:	12998
Epoch time:	85006.07291204
	Sun Jan 6 01:44:59.600 1985 UTC
Element set:	306
Inclination:	82.9600 deg
RA of node:	35.4020 deg
Eccentricity:	0.0020686
Arg of perigee:	98.1214 deg
Mean anomaly:	262.2188 deg
Mean motion:	12.02953708 rev/day
Decay rate:	4e-08 rev/day ²
Epoch rev:	13414
Semi major axis:	8043.192 km
Anom period:	119.705354 min
Apogee:	1702.329 km
Perigee:	1669.052 km
Ref perigee:	2562.09549100
	Sun Jan 6 02:17:30.422 1985 UTC

Satellite:	OSCAR-10
Catalog number:	14129
Epoch time:	85006.75331820
	Sun Jan 6 18:04:46.692 1985 UTC
Element set:	153
Inclination:	25.9806 deg
RA of node:	159.5633 deg
Eccentricity:	0.6017188
Arg of perigee:	337.5136 deg
Mean anomaly:	4.4113 deg
Mean motion:	2.05851439 rev/day
Decay rate:	4.5e-07 rev/day ²
Epoch rev:	1180
Semi major axis:	26105.904 km
Anom period:	699.533609 min
Apogee:	35436.773 km
Perigee:	4019.946 km
Ref perigee:	2562.74736555
	Sun Jan 6 17:56:12.383 1985 UTC
Beacon:	145.8100 MHz

rs-5
Wed Jan 16 01:52:01.999 1985 UTC:
Ascending node at -115.9
Nodal period: 119.55312 min
Longitude increment:
30.015236 deg w/orbit
Element set 211, epoch:
Tue Jan 8 10:33:08.739 1985 UTC

rs-7
Wed Jan 16 00:13:00.591 1985 UTC:
Ascending node at -95.4
Nodal period: 119.19352 min
Longitude increment:
29.925274 deg w/orbit
Element set 186, epoch:
Tue Jan 8 11:26:24.103 1985 UTC

rs-8
Wed Jan 16 01:16:24.872 1985 UTC:
Ascending node at -104.5
Nodal period: 119.76180 min
Longitude increment:
30.067457 deg w/orbit
Element set 306, epoch:
Sun Jan 6 01:44:59.600 1985 UTC

Satellite:	RS-7
Catalog number:	13001
Epoch time:	85008.47666787
	Tue Jan 8 11:26:24.103 1985 UTC
Element set:	186
Inclination:	82.9620 deg
RA of node:	27.3830 deg
Eccentricity:	0.0021111
Arg of perigee:	329.0869 deg
Mean anomaly:	30.8968 deg
Mean motion:	12.08691514 rev/day
Decay rate:	4e-08 rev/day ²
Epoch rev:	13507
Semi major axis:	8017.700 km
Anom period:	119.137099 min
Apogee:	1662.041 km
Perigee:	1628.188 km
Ref perigee:	2564.46956726
	Tue Jan 8 11:16:10.611 1985 UTC

Satellite:	OSCAR-9
Catalog number:	12888
Epoch time:	85009.42669701
	Wed Jan 9 10:14:26.621 1985 UTC
Element set:	721
Inclination:	97.6154 deg
RA of node:	353.6542 deg
Eccentricity:	0.0004247
Arg of perigee:	97.6793 deg
Mean anomaly:	262.4920 deg
Mean motion:	15.26851058 rev/day
Decay rate:	1.328e-05 rev/day ²
Epoch rev:	18100
Semi major axis:	6860.335 km
Anom period:	94.311753 min
Apogee:	505.738 km
Perigee:	499.911 km
Ref perigee:	2565.44443650
	Wed Jan 9 10:39:59.313 1985 UTC
Beacon:	145.8250 MHz

Satellite:	oscar-11
Catalog number:	14781
Epoch time:	85009.61342034
	Wed Jan 9 14:43:19.517 1985 UTC
Element set:	53
Inclination:	98.2154 deg
RA of node:	76.9032 deg
Eccentricity:	0.0014001
Arg of perigee:	6.7366 deg
Mean anomaly:	353.4033 deg
Mean motion:	14.61937166 rev/day
Decay rate:	6.2e-07 rev/day ²
Epoch rev:	4586
Semi major axis:	7062.142 km
Anom period:	98.499445 min
Apogee:	694.173 km
Perigee:	674.398 km
Ref perigee:	2565.61467376
	Wed Jan 9 14:45:07.812 1985 UTC
Beacon:	145.8260 MHz

oscar-9
Wed Jan 16 01:05:58.170 1985 UTC:
Ascending node at -131.5
Nodal period: 94.37097 min
Longitude increment:
23.590418 deg w/orbit
Element set 721, epoch:
Wed Jan 9 10:14:26.621 1985 UTC

oscar-11
Wed Jan 16 01:07:45.451 1985 UTC:
Ascending node at -49.1
Nodal period: 98.55777 min
Longitude increment:
24.638807 deg w/orbit
Element set 53, epoch:
Wed Jan 9 14:43:19.517 1985 UTC

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.